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Abstract

The period from 1914 to 1935 in the United States is unique in that it was the only time that both privately-issued bank notes (national bank notes) and central bank-issued bank notes (Federal Reserve notes) were simultaneously in circulation. This paper describes some lessons relevant to e-money from the U.S. experience during this period. It argues that Federal Reserve notes were not issued to be a superior currency to national bank notes. Rather, they were issued to enable the Federal Reserve System to act as a lender of last resort in times of financial stress. It also argues that the reason to eventually eliminate national bank notes was that they were potentially a source of bank reserves. As such, they could have threatened the Federal Reserve System's control of the reserves of the banking system and thereby the Fed's control of monetary policy.

JEL classification: E41, E42, E58
Bank classification: Bank notes; E-money; Financial services

Résumé

Aux États-Unis, la période allant de 1914 à 1935 présente un caractère unique car c'est la seule époque où des billets émis par des entités privées (les banques nationales) et la banque centrale (la Réserve fédérale) circulaient en parallèle. L'auteur décrit quelques enseignements applicables aux monnaies électroniques, tirés de cette époque aux États-Unis. Il soutient que l'émission de billets par la Réserve fédérale n'avait pas pour objectif de créer une monnaie supérieure aux billets des banques nationales, mais de permettre à la Réserve fédérale d'offrir des prêts de dernier ressort en cas de tensions financières. Il affirme également que c'est parce qu'ils pouvaient représenter une source de réserves bancaires que les billets des banques nationales ont finalement été retirés de la circulation. Ainsi, ils auraient pu menacer le contrôle exercé par la Réserve fédérale sur les réserves du système bancaire et, par conséquent, sur la politique monétaire.

Classification JEL : E41, E42, E58
Classification de la Banque : Billets de banque; Monnaie électronique; Services financiers

Non-Technical Summary

- The paper studies the United States economy during the period when a governmentally-issued e-money-like media of exchange circulated alongside multiple privately-issued ones. Specifically, it studies the period from 1914, when the Federal Reserve banks began issuing Federal Reserve notes that circulated alongside national bank notes, until 1935, when the latter went out of circulation.

- The problem with national bank notes was that they were not an "elastic currency" due to the fact that national banks had to deposit government bonds as collateral before they could be issued.

- Although the inelasticity problem could have been solved by removing the bond collateral requirement, it was necessary for Federal Reserve banks to issue notes so that they could act as lender of last resort, which required the ability to issue a widely accepted medium of exchange.

- It was necessary to eliminate national bank notes, so that the Federal Reserve would have sole control of the quantity of bank reserves.

    The problem: Federal Reserve banks were required to accept national bank notes as reserves against deposits, which had the effect of permitting national banks to create reserves for the banking system.

- National bank notes were not removed from circulation more quickly due to difficulties getting Federal Reserve notes into circulation and fears of the disruptions that would be caused if national bank notes were withdrawn more quickly than Federal Reserve notes could be put into circulation.

- Federal Reserve Bank notes, as distinct from Federal Reserve notes, were available as a backup in case national bank notes were withdrawn quickly after the Federal Reserve Act was passed.

- Takeaways:

    1. Governmentally-issued and privately-issued e-moneys can circulate simultaneously.
    2. That the Federal Reserve banks were given a monopoly on bank note issuance is not an argument for giving central banks a monopoly on e-money issuance. Privately-issued e-moneys only threaten central banks' ability to conduct independent monetary policy if they threaten central banks' seigniorage.
    3. Given the information differences between paper currency and e-money, it is unlikely that governmentally-issued e-money and privately-issued e-moneys will have the same form.

1 Introduction

The institutions and technologies that exist in the world today differ from those that existed in the past. Nonetheless, there are many institutions and technologies in the past which bear enough similarities to those that exist today that there is much that can be learned from studying their history. One such case is the notes issued by private and government banks in the United States prior to 1935. These bank notes shared many of the characteristics of the financial instruments that are or would be classified as e-money, which I define as monetary value represented by a claim on the issuer that is stored on an electronic device and accepted as a means of payment by persons or entities other than the issuer.[1]

Throughout most of U.S. history, bank notes have been issued either solely by private banks or solely by the government through the Federal Reserve System, the central bank. From 1786 to 1914, bank notes were issued solely by private banks. State banks were the issuers from 1786 to 1863; both state and national banks from 1864 to 1866; and only national banks from 1866 to 1914. After 1935, bank notes were solely issued by the government in the form of Federal Reserve notes.[2] The period from 1914 to 1935 is unique in that it was the only time that both privately-issued and governmentally-issued bank notes were simultaneously in circulation. Thus, because national bank notes and Federal Reserve notes were similar to e-money, this period allows the study of an economy with multiple privately-issued e-money-like media of exchange and a governmentally-issued one.[3]

Studying this period can shed light on several questions with regard to what the government's role should be with respect to e-moneys. Specific questions that can be addressed are:

1. Should the central bank issue e-money?
2. If privately-issued e-moneys are already in existence, can the central bank get its e-money into circulation?
3. If the central bank should issue e-money, what form should that e-money take?
4. Can privately-issued and central-issued e-moneys coexist, or if the central bank issues e-money will it become the sole issuer?
5. Should the central bank be the monopoly issuer?

The paper proceeds as follows: Section 2 provides a brief description of the Federal Reserve System. Section 3 describes Federal Reserve notes and argues that they satisfy

[1]My definition is similar to that of Fung, Molico, and Stuber (2014), except that they include the requirement that e-money be issued on receipt of funds. Excluding this requirement sharpens the usefulness of the experience with Federal Reserve notes for learning about the coexistence of governmentally-issued and privately-issued currency systems. It should also be noted that Bitcoin and most other digital and cryptocurrencies are not e-moneys under this definition because they do not have an issuer and thus cannot be a liability of the issuer. For that reason, Bitcoin and other cryptocurrencies are not considered here.

[2]This period runs until 31 May 1935 when, according to the *Annual Report of the Comptroller of the Currency*, 1935, Table 30, footnote 2, 234, national banks stopped issuing notes because the U.S. Treasury called the only bonds that could be used as collateral to back note issue.

[3]That national bank notes were similar to e-money is discussed in Weber (2015).

my definition of e-money given above. Section 4 explores the question of whether Federal Reserve notes were a more desirable medium of exchange than were national bank notes. Section 5 discusses the mechanism that made the notes of different Federal Reserve banks a uniform currency and the mechanism that made Federal Reserve notes and national bank notes a uniform currency. Section 6 discusses the reasons that it was necessary for the Federal Reserve banks to issue notes, and Section 7 discusses the reasons why it was necessary to eliminate national bank notes. Section 8 discusses why it took until 1934 to eventually eliminate national bank notes from circulation, and Section 9 describes the actions the government took in 1934 to accomplish this. Section 10 describes Federal Reserve Bank notes, a second new currency authorized by the Federal Reserve Act. Section 11 concludes with a summary and some lessons.

2 The Federal Reserve System: A Brief Introduction

The Federal Reserve System was essentially set up to be a system of banks located across the United States that would serve as banks for commercial banks and for the U.S. government. I will refer to these banks as district Federal Reserve Banks or simply district banks. The original Federal Reserve Act did not specify the number or location of these districts, but simply specified that there be "not less than eight nor more than twelve" (Sec. 2) and that the "continental United States, excluding Alaska" (Sec. 2) be divided into districts. On 2 April 1914, the Reserve Bank Organization Committee decided that there would be 12 districts and that district banks would be located in Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, Minneapolis, St. Louis, Kansas City, Dallas, and San Francisco.

The Federal Reserve Act also created a Federal Reserve Board to "consist of seven members, including the Secretary of the Treasury and the Comptroller of the Currency." (Sec. 10) The Federal Reserve Board did not conduct any of the actual banking business of the Federal Reserve System. Its primary role was to supervise and examine the district banks and to set the rate at which district banks could rediscount commercial and other paper.

The Federal Reserve Act specified that district Federal Reserve Banks were to be owned by the banks in their district that are members of the Federal Reserve System. Only national banks were required to be members of the Federal Reserve System. State banks had the option to join. Member banks were required to buy stock of the Federal Reserve bank in their district. District banks were to have boards of directors that were charged to "perform the duties usually appertaining to the office of directors of banking associations [national banks]...." (Section 4). These boards were to have nine directors, three of whom were bankers, and six of whom were from the private sector. Further, there was an attempt to minimize the influence of elected officials on the Federal Reserve System. "No Senator or Representative in Congress shall be a member of the Federal Reserve Board or an officer or a director of a Federal Reserve bank." (Sec. 4)

The district Federal Reserve banks were permitted to engage in several activities that were normally associated with banking at the time. On the asset side, district banks were permitted:

- "to deal in gold coin and bullion ... [and to] exchange Federal reserve notes for gold,

gold coin, or gold certificates...." (Sec. 14).

- "buy and sell ... bonds and notes of the United States" (Sec. 14), and
- to "discount notes, drafts, and bills of exchange issued or drawn for agricultural, industrial, or commercial purposes...."(section 13)[4]

On the liability side, district banks were permitted:

- to issue notes
- to accept deposits from member banks in the form of "current funds in lawful money, national bank notes, Federal Reserve notes, or checks and drafts upon solvent member banks..." (Sec. 13)
- to accept deposits in the same form for the United States

Assets	Liabilities & Capital
Reserves	Federal Reserve notes
2,250,400	3,336,281
Bills discounted	Member bank deposits
2,687,393	1,780,670
U.S. gov't securities	Other liabilities
287,028	835,288
Other assets	
1,029,283	
Total assets	Total liabilities
6,254,105	5,952,248
	Capital account
	301,857

Table 1: Consolidated Federal Reserve balance sheet as of 31 December 1920, $ thousands

How the Federal Reserve System operated at its inception is shown in Table 1, which shows the consolidated balance of the Federal Reserve System as of 31 December 1920.[5] The two largest asset categories, which make up almost 80 percent of assets, are reserves and bills discounted. The reason that reserves, which were held primarily in the form of gold and gold certificates, are so large is that Federal Reserve banks were required to hold reserves

[4] "Affording a means of rediscounting of commercial paper" was stated as a purpose of the Federal Reserve banks as part of the original Federal Reserve Act.

[5] From the beginning, the assets of the Federal Reserve have been owned by the district banks. The Board of Governors does not own any assets. It obtains the funds for its operation by levying assessments on the district banks.

of 40 percent against their notes in circulation and 35 percent against deposits. The large quantity of bills on the balance sheet shows that the district banks got Federal Reserve notes into circulation by giving them to banks when banks discounted bills at their district bank.

On the liability side, the two largest categories are Federal Reserve notes and member bank deposits. These two categories make up 86 percent of the liabilities of the Federal Reserve System.

Assets	Liabilities & Capital
Reserves	Federal Reserve notes
0	1,268,945
Bills discounted	Member bank deposits
131	2,570,696
U.S. gov't securities	Other liabilities
2,462,602	592,755
Other assets	
2,027,293	
Total assets	Total liabilities
4,488,895	4,432,396
	Capital account
	56,499

Table 2: Consolidated Federal Reserve balance sheet as of 14 November 2014, $ millions

An insight into how the central banking activities of the Federal Reserve System have changed over time is gained by comparing the balance sheet in Table 1 with a current balance sheet shown in Table 2. The composition of the liability sides of the two balance sheets looks similar. Federal Reserve notes and member bank deposits make up approximately 86 percent of liabilities on both balance sheets, although member bank deposits are larger than notes in 2014 whereas notes were larger than deposits in 1920.[6]

However, the composition of the asset side looks quite different. There are no reserves on the current balance sheet. Federal Reserve banks do not have to have reserves against their notes as they are now a fiat currency. Further, currently there is very little borrowing from the discount window, so "Bills discounted" is a small fraction of total assets. And because current monetary policy is implemented through open market operations, Federal Reserve holdings of U.S. government securities are a large fraction of assets.[7] This is in contrast to 1920 when the holdings of government securities were less than five percent of total assets.

[6] "Term deposits held by depository institutions" are not included as member bank deposits in Table 2.

[7] "Other assets" looks large in the 2014 balance sheet as I have included the $39,700 million of "Federal agency securities" and $1,717,896 million of "Mortgage-backed securities" that the Federal Reserve banks hold in this category rather than as holding of U.S. government securities. If I were to include them as U.S. government securities the total would increase to $4,219,197 million or 94 percent of the Fed's total asset holdings.

3 Similarities between Federal Reserve Notes and E-money

In this section, I discuss the similarities between Federal Reserve notes and e-money. These similarities are that Federal Reserve notes had monetary value, were a liability of the issuer, and were widely accepted as media of exchange.

Figure 1: A representative Federal Reserve note

That Federal Reserve notes had monetary value is illustrated by the note shown in Figure 1. Federal Reserve notes were denominated in U.S. dollars. The Federal Reserve Act permitted them to be issued in denominations of $5, $10, $20, $50, and $100.[8] Each Federal Reserve bank issued its own distinct notes, so that there were 12 different Federal Reserve notes in circulation. The identity of the issuing Federal Reserve bank was displayed on the note. For example, the note in Figure 1 was issued by the Federal Reserve Bank of Cleveland, which is the fourth Federal Reserve district. Hence the "4-D" designation on the note.

As mentioned above, Federal Reserve notes were not a liability of the issuing district Bank. The note in Figure 1 states that "THE UNITED STATES OF AMERICA WILL PAY TO THE BEARER ON DEMAND." Further, section 16 of the Federal Reserve Act stated that "said notes shall be obligations of the United States.... They shall be redeemed in gold on demand at the Treasury Department of the United States, in the city of Washington, District of Columbia...."

However, the individual Federal Reserve banks had redemption responsibilities. Section 16 of the Federal Reserve Act also stated that notes "shall be redeemed ... in gold or lawful money at *any* Federal Reserve bank."[italics added] Unlike national bank notes, Federal Reserve notes were redeemable at any Federal Reserve bank, not just the issuing bank.

The Federal Reserve Act contained two provisions to help Federal Reserve notes be widely accepted as media of exchange. One was the provision, mentioned above, that they could

[8] To put these denominations in some perspective, $5 in 1914 is equivalent to approximately $120 today.

be redeemed at any of the 12 Federal Reserve banks. The other, also in Section 16, was that "said notes . . . shall be receivable by all national and member banks and Federal reserve banks and for all taxes, customs, and other public dues."

An interesting contrast between these provisions and similar ones in the National Banking Act is that there is no statement about Federal Reserve notes being acceptable for payments made by the U.S. government. I think the reason is to be found in section 15 of the Federal Reserve Act, which covers government deposits at Federal Reserve banks. At the end of the first paragraph of that section is the statement that, "disbursements [by the government] may be made by checks drawn against such deposits." To me, this statement indicates that the government would be making payments by check, not by Federal Reserve notes.

4 The Relative Desirability of Federal Reserve Notes and National Bank Notes

In my two previous studies of the U.S. experience with bank notes, Weber (2015) and Weber (2014), I presented some characteristics that would make potential media of exchange more desirable for the non-issuer public. These characteristics were that they:

- provide ease of transacting
- are subject to only minimal counterfeiting
- provide a high degree of safety
- are not subject to overissuance, and
- in the case of multiple media of exchange, provide a uniform currency.

When I compare Federal Reserve notes against national bank notes with respect to these characteristics, I find that Federal Reserve notes did not surpass national bank notes in terms of desirability.

Specifically, Federal Reserve notes presented the same transactions difficulties as national bank notes. They were issued in a fixed set of denominations. In fact, the denominations of Federal Reserve notes were the same as national bank notes, except that national bank notes could issue notes of larger denominations ($500 and $1,000) that Federal Reserve banks could not. Thus, both would require the making of change in many transactions.

With respect to counterfeiting, certainly by the time that Federal Reserve notes were introduced, counterfeiting of Federal Reserve notes and national bank notes was minimal. According to Mihm (2007), who has studied counterfeiting extensively,

> Beginning in the twentieth century, people handling paper money ceased to inspect and question its authenticity. Money became almost invisible, the subject of a quick glance, but little more. (loc. 5207)

There was no difference in terms of the safety of the two notes as national bank notes were insured by the government and Federal Reserve notes were obligations of the government. Further, neither could be overissued as the United States was on the gold standard at the time, and both notes were ultimately redeemable in gold.

5 Mechanism that Made Federal Reserve Notes and National Bank Notes a Uniform Currency

In my two previous studies of the U.S. experience with bank notes, I also focused on the mechanisms that were put in place to make the media of exchange of different issuers a uniform currency. I now do the same for the notes issued by the 12 district Federal Reserve banks and then for Federal Reserve notes and the notes of the various national banks. I do this by discussing the provisions in the Federal Reserve Act that worked to make Federal Reserve notes and national bank notes a uniform currency.

For the purposes of this paper, I define multiple media of exchange, both privately-issued and governmentally-issued, of different issuers to be a uniform currency if

1. they are expressed in the same monetary unit;
2. they trade at par (at their face value) in all transactions that involve the non-issuer public; and[9,10]
3. prices are stated in terms of the monetary unit only, which means that different prices are not quoted for different media of exchange.[11]

There were two provisions in the Federal Reserve Act that worked to make the 12 distinct Federal Reserve notes a uniform currency. The first was that notes issued by one Federal Reserve bank were redeemable at any other Federal Reserve bank, not just the issuing bank. The second is that they "shall be receivable by all ... Federal Reserve banks." Thus, a member bank that wanted to pay off a discount loan or make a deposit at a Federal Reserve bank did not have to have the notes of that specific Federal Reserve bank in order to do so. Together, these two provisions worked to make the non-issuer public and national banks indifferent as to which district Federal Reserve Bank's notes they used.

The same section of the Federal Reserve Act, Sec. 16, that contained these provisions also contained a puzzling restriction that could have acted to make the notes of the district banks not a uniform currency among them. The restriction was that a district bank was prohibited from paying out the notes issued by another district bank. Thus, in the normal course of business a district bank could have piled up quantities of notes of other district banks that would be unwanted and that it could not get rid of by paying out. They would be unwanted because the notes of another district bank could not fulfill the reserve requirement that district banks had to hold 40 percent reserves in the form of gold or gold deposits against their circulation and 35 percent reserves against deposits.[12]

[9] I refer to the relevant population as the "non-issuer public" rather than the non-bank public because the issuers of e-money may not be banks. I use the term "trade at par" instead of "fixed exchange rate" since the latter term is usually applied to media of exchange expressed in different monetary units and implicitly assumes the existence of a government entity (or entities) that stands willing to always make exchanges at the fixed rate.

[10] Note that this definition requires different privately-issued media of exchange trade at par with each other, not just with whatever is considered lawful money.

[11] Multiple media of exchange could not be a uniform currency if there were such things as "discounts for cash."

[12] This restriction is similar to the one that prohibited a national bank from counting notes of another national bank as part of its reserve requirement against deposits.

To overcome this restriction, the Federal Reserve Act established a clearing facility (it is called a redemption facility in the Act) for Federal Reserve notes, quite similar to that established in 1874 for clearing notes of national banks. This facility was a mechanism that enabled Federal Reserve banks to exchange notes of other Federal Reserve banks for gold at par. The clearing facility worked as follows: A district bank was required to hold at the Treasurer "a sum in gold ... in no event less than five per centum" (Sec. 16) of the notes issued to it. The amount of gold in this deposit was counted as part of the 40 percent gold reserve requirement. When a district bank received notes of another district bank, as was extremely likely to occur, it was required to send those notes to the Treasurer. The district bank would then receive gold or gold certificates in return. When its notes were presented, the amount it had in this fund was debited and it would be required to send gold to the Treasurer to bring its fund up to the required level.

The Federal Reserve Act also contained provisions to ensure that national bank notes and Federal Reserve notes exchanged at par. One was the provision that Federal Reserve banks had to receive from national banks the notes of any national bank notes for deposit. Such deposits could count as reserves against deposits for national banks. Further, Sec. 13 permitted one Federal Reserve Bank to send national bank notes to another Federal Reserve bank and receive a deposit to be used "solely for exchange purposes." Federal Reserve notes were not included in this provision presumably because all exchanges of Federal Reserve Bank notes had to be done through the clearing (redemption) mechanism described above.

There were some legislators who, at the time the Federal Reserve System was established, wanted to completely replace national bank notes with Federal Reserve notes.[13] Despite this, the Federal Reserve Act strengthened the mechanism that made national bank notes a uniform currency. It did so by changing the forms in which national banks could hold the reserves they were required to hold against deposits. Prior to the Federal Reserve Act, these required reserves could be held in the form of lawful money in the bank's vault or, depending on the location of the bank, deposits in a reserve city or central reserve city bank. National banks could not use the notes of other national banks to satisfy the reserves they were required to hold against deposits. This restriction could potentially have caused national bank notes to not trade at par in interbank transactions.[14]

The Federal Reserve Act eliminated this restriction by no longer allowing deposits at reserve city or central reserve city banks to be counted as reserves. In their place, reserves could be held in the form of deposits at a district Federal Reserve Bank, and these deposits could be made in the form of notes of national banks: "Any Federal reserve bank may receive from any of its member banks ... deposits of current funds in lawful money, national-bank notes..." (Sec. 13)[15] The holding of reserves by member banks with the Federal Reserve

[13]For example, the *Report from the House of Representatives Committee on Banking and Currency* chaired by Carter Glass stated that "The only way to relieve the bad conditions that have developed in connection with national-bank currency is, therefore, generally admitted to be the abandonment of the bond-security plan and the introduction of something else in its place" (p. 22). However, this abolition was not provided for in the Federal Reserve Act.

[14]See Weber (2015) for further discussion of this point. In that paper, I also discuss the mechanism that was put in place to mitigate this restriction and ensure that notes of different national banks would trade at par in all transactions.

[15]There is no mention that national bank notes had to be received at par. However, I think this was

System from 1917 to 1936 is shown in Figure 2. Reserves were below $2.5 billion until 1933 after which time they increased dramatically.[16]

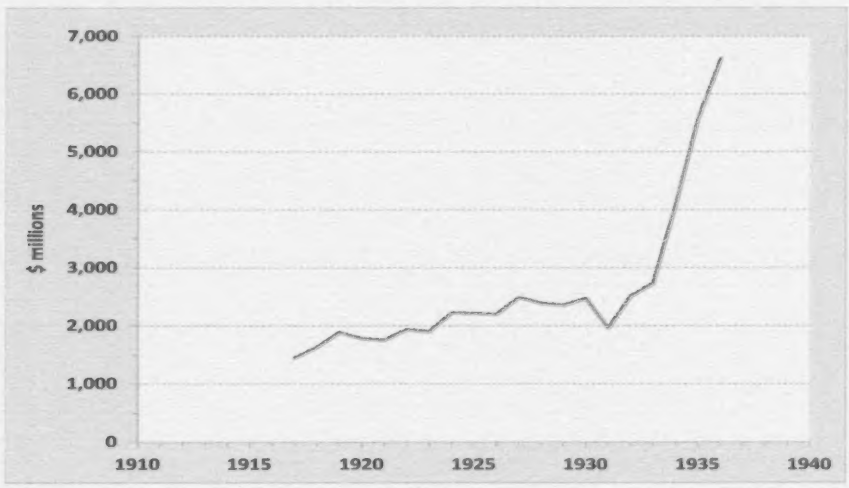

Figure 2: Member bank reserve deposits at Federal Reserve banks, 1917 - 1936

6 Why Issue Federal Reserve Notes?

The reason for issuing Federal Reserve notes was that national bank notes failed to provide an elastic currency, which was considered to be important for the U.S. economy at the time. This is clearly stated in the official title of the Federal Reserve Act, which states that one of the purposes is to "furnish an elastic currency."

There were two respects in which national bank notes were considered to not be elastic. The first was that the national banking system did not provide a method by which banks could pool their gold resources during periods of financial stress. Or, stated slightly differently, the national banking system did not have a lender of last resort for the system as a whole. As the *Report from the House of Representatives Committee on Banking and Currency* submitted on 9 September 1913 stated it, "the national banking system, among other defects, fails to afford any safeguard against panics and commercial stringencies or any means of alleviating them" (p. 6).

Instead, it was up to the individual banks or groups of banks to act in periods of financial stringency:

implicitly understood to be the case.

[16]The figure begins with 1917 because the Board of Governors of the Federal Reserve System (1943) states that the numbers that it gives for 1914 to 1916 are inconsistent with the later numbers used in the figure.

> In 1873, 1884, 1890, 1893, 1896, and 1907 [times of panics and commercial stringencies in the United States] ... it has been necessary for large groups of banks to suspend specie payments. They have done so as the result of concerted action, and one feature of the situation upon each of these occasions has been a genuine effect to relieve conditions by resorting to an issue of obligations for which the banks became jointly liable. (*Report from the House of Representatives Committee on Banking and Currency*, 4)[17]

The "obligations for which the banks became jointly liable" refers to the times when "To meet the demand for gold, clearinghouse associations or groups of bankers pooled resources to provide payment facilities during periods of stress. Such private facilities had to assume the risk of defaults. A central bank that pooled reserves and lent during a panic would provide 'elasticity' at lower cost." (Meltzer, 2003, 69)

The second respect in which national bank notes were not elastic is that the supply of national bank notes in various parts of the country did not fluctuate in accord with the large seasonal fluctuations in the demands for currency. At the time of the passage of the Federal Reserve Act, the agricultural sector was an important part of the U.S. economy. The demands for currency by agents involved with this sector were highly seasonal, coinciding with planting in the spring and with harvesting and crop-moving in the fall. National bank notes were said to be an inelastic currency in the sense that notes were not transferred from one part of the country to other parts of the country as the demand for notes in various parts of the country fluctuated due to the changes in seasonal demands. This failure was also described in the *Report from the House of Representatives Committee on Banking and Currency*:

> ... the national banking system, with its many merits, has not proved responsive to the seasonal needs of the community. At periods of exceptional demand for credit the movement of currency between various points, with attendant expense and delay, has been enormous, while the expansion of this currency has been slow and halting, local necessities being met by withdrawing circulating media from other regions. In consequence, the marketing of the country's annual crops has been slow, difficult, and expensive, and it has frequently happened that various sections of the Nation have been obliged to depend too largely upon the limited extension of credit to them by banks located elsewhere.
>
> Conversely, it has been found that whenever the seasonal needs of credit in agricultural regions throughout the United States had been met and when the crops there produced had been fully disposed of there was an accumulation of currency, partly borrowed from other portions of the country, partly of local origin, which could not be used to advantage upon safe or sound security throughout the less active portions of the business year, and which was therefore shipped to banks in distant cities, that it might be thus put to some employment that would yield its owners an income. (p. 5)

[17] By suspension of payments is meant payments on deposits. Payments on notes were not suspended as they were governmentally insured.

The reason that the national bank note currency was "inelastic," at least according to the *Report from the House of Representatives Committee on Banking and Currency*, was the requirement that national bank notes be backed by U.S. government bonds as collateral:[18]

> ...bond-secured notes are not "elastic." By this is meant that the necessity of purchasing bonds to be deposited with a trustee for the protection of note issues prevents banks from issuing these notes as freely and promptly as they otherwise would, while it also prevents them from retiring or contracting the notes as freely and promptly as would otherwise be the case. There is little or no disagreement at present among students of the banking and currency problem in the United States that the retirement of the bond-secured notes is essentially necessary if success is to be had in restoring elasticity to the circulation and in making the national banking system really responsive to the needs of business.
>
> ...every plan of currency or banking reform that has been put forward during the past 15 years has contained as an important factor some provision for getting rid of the bond-secured notes.... The only way to relieve the bad conditions that have developed in connection with national-bank currency is, therefore, generally admitted to be the abandonment of the bond-security plan and the introduction of something else in its place. (22)

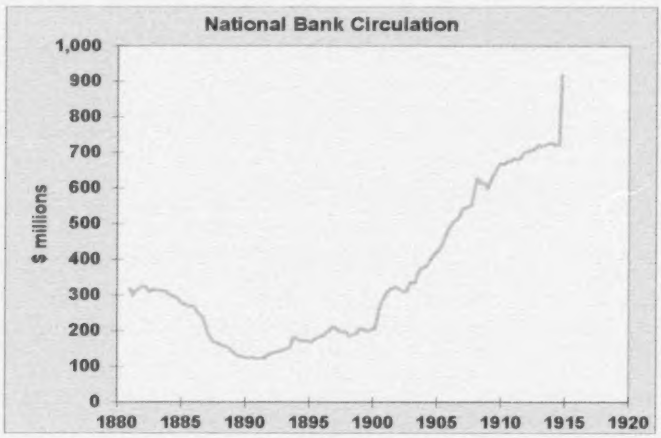

Figure 3: National Bank Note Circulation at Call Report Dates

If the bond-security requirement was the reason that national bank notes were inelastic, then a natural question is why the "something else in its place" is not to simply permanently remove this requirement and allow national banks to issue notes based on a wider array of

[18]Some arguments that the bond security requirement did not necessarily cause national bank notes to be an inelastic currency, in the sense defined above, are given in the Appendix.

collateral. There is some strong evidence that such a national bank currency without the bond-security restriction would have been elastic. On 30 May 1908, the "Act to amend the national banking laws," more commonly called the Aldrich-Vreeland Act, was passed. It authorized national banks to issue notes up to 75 percent of "any securities, including commercial paper, held by a national banking association" that were deposited with the Comptroller as collateral. There were two provisions on this additional circulation: (i) national banks could only issue notes with this collateral if they were members of a "national currency association" consisting of, "not less than ten in number," banks in a city.[19] (ii) The banks in an association were "jointly and severally liable to the United States for the redemption of the additional circulation."

Nonetheless, the Aldrich-Vreeland Act allowed national banks to issue a currency that did not have to be bond-secured. And this currency seems to have been quite elastic. As the blip in 1914 in Figure 3 shows, during the crisis of 1914 national bank note circulation increased by 27 percent between June and September of that year. The vast majority of this additional currency was not bond-secured.

It appears that removing the bond-security requirement for national bank note issuance would have provided an elastic currency. Thus, there must have been some other reason why "the Banking and Currency Committee has reached the conclusion that the issue of national-bank notes now current should ... be retired ... and that in their place a new issue of notes put out by the Government of the United States and closely controlled by it should be authorized" (*Report from the House of Representatives Committee on Banking and Currency*, p. 24). In my opinion, the major reason for reforming the banking system in the United States when the Federal Reserve Act was passed was to establish a central banking authority in the country.

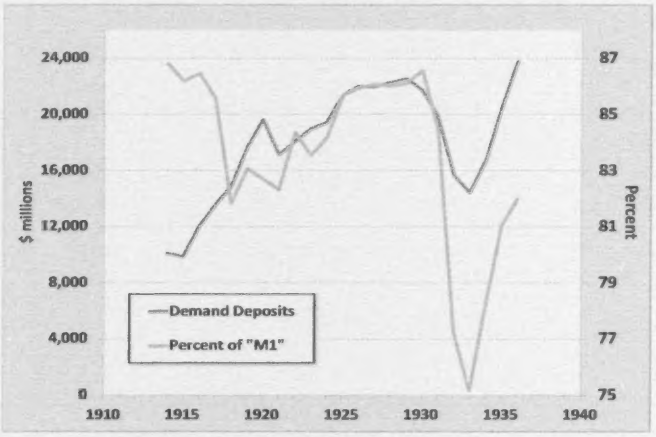

Figure 4: Demand deposits, total and as a percentage of "M1", 1914-1935

[19]It had to be the judgment of the Secretary of the Treasury that "business conditions in the locality demand additional circulation" before these notes could be issued.

At this time, demand deposits were by far the primary component of the money stock. As Figure 4 shows, deposits made up more than 80 percent of the "M1" money stock for most years from 1914 to 1935, and were still greater than 75 percent during the Great Depression years of 1932 and 1933.[20] In the event of a run on bank deposits (the desire of depositors to convert their deposits into currency or gold), the desire of banks would be to get more currency or gold.

Given that the United States was operating under the gold standard at the time, the country's stock of gold was not subject to quick adjustment as it was determined by the country's balance of trade. Consequently, in the aggregate banks could not readily increase their gold reserves. Eliminating the bond-security provision for note issuance would have relaxed the constraint on banks issuing more currency when demanded by individuals. However, if any mutualization of redemption liability had been involved at the same time, as was the case with the Aldrich-Vreeland emergency currency, then all banks involved would have had to bear the risk of default.

A central bank acting as a lender of last resort and providing currency would take this risk away from banks, which Meltzer (2003) argues was one reason that banks supported the formation of the Federal Reserve System. Further, if this central bank were to acquire a large fraction of the nation's gold and had the power to issue notes with only fractional gold backing, as the Federal Reserve banks were allowed to do, it would allow for a larger and more elastic supply of currency in the case of a run on bank deposits.

Thus, the answer to the question of why Federal Reserve notes were issued is that they were necessary if the Federal Reserve System were to fulfill one of the objectives of a central bank. A central bank may have to act as lender of last resort, and fulfilling that function could require the issuance of currency.

7 Why Eliminate National Bank Notes?

The answer to the question of why it was necessary to eliminate national bank notes is that this was also necessary if the Federal Reserve System were to fulfill a second central banking function. In addition to being able to act as a lender of last resort, another function of a central bank, at least in the time period we are considering, is to control the reserves available to the banking sector and in this way conduct monetary policy. The central bank would thereby exercise control over the extension of credit in the economy. If national banks could issue notes, then the Federal Reserve System would not have complete control over the reserves of the banking system because national banks would also have the ability to create reserves for the banking system. The reason: national bank notes could be deposited with Federal Reserve banks, and these deposits counted as part of reserves that member banks were required to hold against deposits. Thus, a member bank could take national bank notes that it received in the course of business, deposit them at its district Federal Reserve bank, and then make loans on the basis of these reserves.[21]

[20] My measure of "M1" is the sum of "Demand deposits adjusted" and "Currency outside banks" from Table No. 9 in *Banking and Monetary Statistics*.

[21] This point is made very well in the article, "End of Bank Notes Meets No Dissent," *The Wall Street Journal*, 17 March 1935.

In actuality, it does not appear that the quantity of national bank notes played a large role in the amount of reserves available to the U.S. banking system. The quantity of national bank notes in circulation and the total quantity of reserves in the system from 1916 to 1936 are shown in Figure 5.[22] Two points are apparent: (i) The quantity of national bank notes was a small fraction of total reserves, averaging about 23 percent between 1916 and 1933. (ii) The correlation between the two series over that same time period was only 0.09.[23]

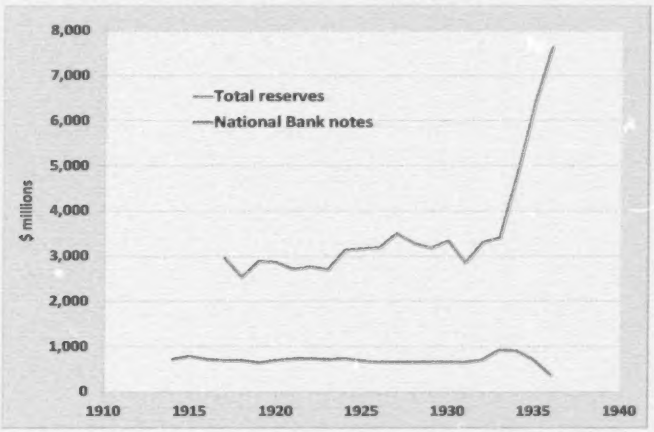

Figure 5: National bank notes and total reserves of the banking system, 1914-1936

8 Why Take So Long to Eliminate National Bank Notes?

The first Federal Reserve notes were issued in 1914. The action to finally remove national bank notes from circulation did not occur until 1934. During this time, national bank notes and Federal Reserve notes circulated side-by-side. Given that the existence of national bank notes could potentially interfere with the Federal Reserve System controlling the quantity of reserves in the banking system, a natural question is why weren't actions taken to get national bank notes out of circulation quickly once the Federal Reserve banks were into operation.

The answer is not that eliminating national bank notes was prohibited by the Federal Reserve Act. There were provisions in the Federal Reserve Act intended to reduce the quantity of national bank notes in circulation and actions were taken to get them out of

[22]Total reserves are the sum of "Deposits Member bank – reserve account" from Table No. 35 in *Banking and Monetary Statistics* and the difference between "Total currency" and "Currency outside banks" from Table No. 9 in the same publication.

[23]The reason for starting in 1916 is that, as noted above, "Deposits Member bank – reserve account" is only a consistent series beginning then. I stop in 1933 because of the actions to reduce the quantity of national bank notes beginning in 1934 (see below).

circulation. According to Weyforth (1925), there were three major provisions intended to reduce the quantity of national bank notes in circulation:

1. The National Banking Act required banks to hold government bonds in order to go into business. As a result, some might have issued notes simply because they had to hold the bond collateral anyway. The Federal Reserve Act removed this requirement, so some banks might have reduced circulation as a result.

2. Section 18 of the Federal Reserve Act permitted national banks desiring to reduce their circulation to sell the bonds securing this circulation back to the Federal Reserve at par. Since the 2s which made up the vast majority of the collateral against notes were selling below par at this time, this provision enabled national banks to reduce circulation without taking losses on the collateral. However, national banks were limited to selling $25 million per year and this provision did not take effect until two years after the Federal Reserve Act was passed.

3. The Federal Reserve banks were permitted to engage in open market operations and take the bonds with the circulation privilege off the market.

It appears that at least until 1917 the provisions to get national bank notes out of circulation were being used.[24] The quantity of national bank notes fell from $716 million on 30 June 1913 to $639 million on 30 June 1919.

However, the reduction of $77 million of national bank notes does not seem like all that much. So, why weren't these tools used to get national bank notes out of circulation more rapidly? I think the answer to this question is that there were difficulties getting Federal Reserve notes into circulation and fears of the disruptions that would be caused if national bank notes were withdrawn more quickly than Federal Reserve notes could be put into circulation. This view is expressed by Noll (2011):

> with the start of Federal Reserve operations, the dispersion of Federal Reserve notes across the country would take some time, and no one knew how quickly national banks would go out of the currency business and stop issuing their own notes. There was a real possibility that national bank notes might be withdrawn from circulation faster than the new Federal Reserve notes could be issued to the public. This could cause sudden drops in the number of bank notes in different parts of the country, resulting in regional scarcities of currency. (32)

The primary difficulty in getting Federal Reserve notes into circulation is that they were primarily to be issued for discounts of real bills.[25] There was no guarantee that such discounts would be large enough to replace all national bank notes or that they would be from banks in the same locations as those withdrawing their notes from circulation. Further, although Federal Reserve banks were allowed to make open market purchases, according to the *Report*

[24] Weyforth (1925, 536) argues that, at least until the United States entered WWI, the process of getting national bank notes out of circulation was "actively under way."

[25] According to the *Report from the House of Representatives Committee on Banking and Currency*, 48, the "fundamental business purpose" of the Federal Reserve System was "providing for discount operations."

from the House of Representatives Committee on Banking and Currency, 52, such purchases were to be made to "make their rate of discount effective in the general market at those times ... when rediscounts were slack." There was no mention of open market purchases being used to reduce the circulation of national bank notes by purchasing the government bonds used as collateral backing for them.

As Figure 6 shows, the concern about getting Federal Reserve notes into circulation quickly appears to have been well founded.[26] As of 30 June 1917, almost three years after the Federal Reserve banks went into operation, there was only $507 million of Federal Reserve notes in circulation. However, Federal Reserve notes in circulation increased rapidly over the next three years: to approximately $1.7 billion in 1918 and slightly over $3 billion in 1920. The increase was due to the Federal Reserve System's role in aiding the Treasury in financing WWI.[27]

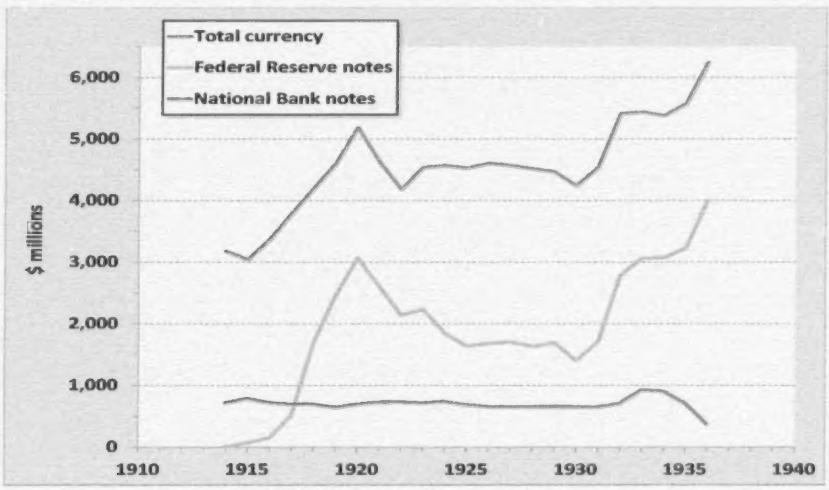

Figure 6: Federal Reserve notes, National Bank notes, and total currency, 1914 - 1936

As Figure 7 also shows, the withdrawal of national bank notes stopped after 1919. National bank note circulation stayed between $650 and $701 million between 1920 and 1932, when it then dramatically increased to $920 million during the Great Depression. According to Weyforth (1925, 537), the Federal Reserve did not continue to actively pursue retirement of national bank notes after WWI ended because the 2s of 1930, which were the bonds that were the primary collateral for national bank notes, were selling above the bonds that they

[26] In all figures, total currency is the sum of gold certificates, gold and silver coin, United States notes, Federal Reserve notes, Federal Reserve Bank notes, and national bank notes. See *Banking and Monetary Statistics, 1914 - 1941*, Table No. 109.

[27] See Meltzer (2003, 83-89) for a discussion of the actions taken by the Federal Reserve System.

would be traded for if taken to the Treasury for conversion.[28] Thus, the Federal Reserve banks would have suffered losses if they had purchased these bonds in order to curtail the circulation of national bank notes.

9 How National Bank Notes Were Eliminated in 1934

The way in which national bank notes were eliminated from circulation is that the government bonds that could serve as security for national bank note issuance were withdrawn. In 1934 there were three issues of bonds with issuing privileges – the 2s of 1930, the Panama Canal 2s, and bonds bearing interest of 3.5 percent or less. On 10 March 1934 the U.S. Treasury announced that it would redeem the 2s of 1930 on 1 July and the Panama Canal 2s on 1 August of that year. The circulation privilege on the 3.5s was to expire on 22 July. Thus, the result of the Treasury's actions would be that there would be no bonds available to back national bank notes after 1 August 1934.

Three actions were taken before this Treasury announcement. On 28 December 1933 Acting Secretary of the Treasury Morgenthau issued an order requiring "every person subject to the jurisdiction of the United States forthwith to pay and deliver to the Treasurer of the United States all gold coin, gold bullion and gold certificates." This was to be accomplished by delivering the gold to Federal Reserve banks. The Gold Reserve Act of 30 January 1934 made the gold in Federal Reserve banks the property of the United States. On 1 February 1934, President Roosevelt devalued the dollar. He raised the dollar price of gold from $20.67 per ounce to $35 per ounce, a 59 percent devaluation.

One effect of these actions was that the Federal Reserve System had a much larger nominal amount of gold than it did before. Its holdings of gold and gold certificates went from $3.5 billion on 31 December 1933 to $5.1 billion on 31 December 1934 and $7.6 billion on 31 December 1935. Thus, it had a greater ability to set monetary policy (affect bank reserves). Hence, any case for allowing national banks to conduct monetary policy independent of the Fed would have been significantly weakened.

The other effect of these actions was to give the government a gold "profit" from the devaluation. This profit can also be partially seen on the Fed's balance sheet. "Deposits – United States Treasurer" were $2.8 million, $120.7 million, and $543.8 million on those three dates, respectively. This profit could be used to retire government debt, which had expanded from $1.2 billion at the end of December 1916 to $23.8 billion at the end of December 1933 as the result of WWI and the Great Depression. This profit could be used to retire the bonds with issuing privileges.

Thus, in 1934 there was the opportunity to eliminate the possibility of national banks being able to conduct monetary policy while reducing government debt at the same time.

> A striking feature of the plan to retire national bank notes was that it apparently pleased all shades of monetary opinion – something, it is believed, that has been accomplished by no other monetary measure taken up by the administration. The sound-money men looked upon it as a wise and conservative move with no inflationary consequences, but with, on the contrary, assurances against inflation

[28] During this period, bond issues were denoted by their coupon rate and the date at which they could first be called. Thus, the 2s of 1930 carried a 2 percent coupon rate and could be called beginning in 1930.

in that it removed from the grasp of Congress all the remaining unallocated portion of the "profit" resulting from gold devaluation. The inflationists, on the other hand, viewed the plan as a victory, because it involved the use of the gold "profit" to retire public debt. (*The Wall Street Journal*, 17 March 1935)

10 Federal Reserve Bank Notes

Above I mentioned that one of the concerns about the passage of the Federal Reserve Act was that national bank notes would be withdrawn quickly and that Federal Reserve notes could not be put into circulation quickly enough to prevent a disruption to the nation's supply of currency. In addition to the actions taken to guard against this possibility mentioned above, a second safeguard was included in the Federal Reserve Act. Sec. 4 of the Act provided that district banks could issue a second type of notes, which were called Federal Reserve Bank notes as distinct from Federal Reserve notes.[29] Specifically, the provision stated that "Upon deposit with the Treasurer of the United States of any bonds of the United States *in the manner provided by existing law relating to national banks*, to receive from the Comptroller of the Currency circulating notes ... equal in amount to the par value of the bonds so deposited...." [italics added] The italicized wording suggests there were two major differences between Federal Reserve Bank notes and Federal Reserve notes:

1. Federal Reserve Bank notes were a bond-secured currency, 100 percent collateralized by U.S. government bonds with the Treasurer. In contrast, Federal Reserve notes were fractionally backed by gold.

2. Federal Reserve Bank notes were obligations of the issuing Federal Reserve district bank. In contrast, Federal Reserve notes were obligations of the U.S. government.

Federal Reserve Bank notes had the same general appearance as national bank notes, the only exception being that the name of the issuing Federal Reserve bank appeared on the left front of the note instead of the name of the issuing national bank.

As Figure 7 shows, very few Federal Reserve Bank notes were issued initially (only $11 million in 1918) because the risk of a withdrawal of a large amount of national bank notes did not materialize. The two other increases in the circulation of Federal Reserve Bank notes – between 1919 and 1921 and in 1933 and 1934 – were not due to the withdrawal of national bank notes from circulation. According to Noll (2011) the first was due to the need for small-denomination notes to replace the silver certificates that were going out of circulation as the U.S. sent silver to Great Britain. The second was due to the need for an emergency currency during the bank holiday in 1933.

11 Summary and Lessons

If the goals of the Federal Reserve Act with respect to currency were to eliminate national bank notes and replace them with a new, elastic currency that was not secured by government

[29] Federal Reserve Bank notes is the name given in reports about these notes. They are not named in the Act itself.

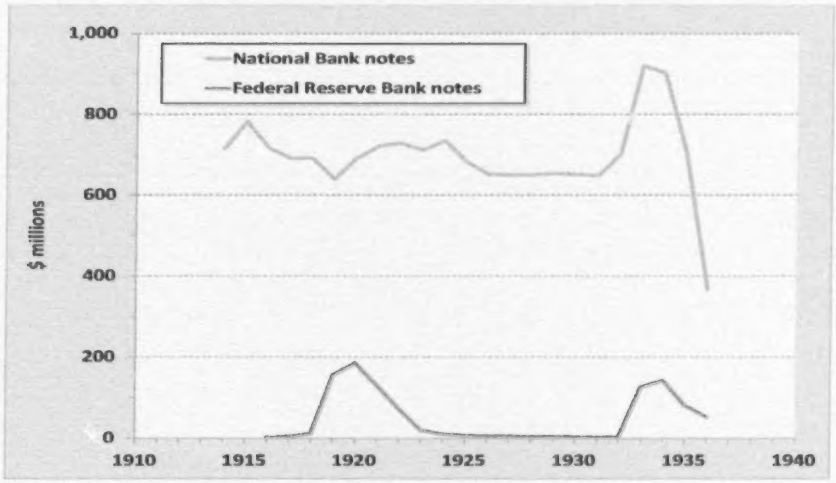

Figure 7: Federal Reserve Bank notes and National Bank notes in circulation, 1914 - 1936

bonds, then it can be argued that these goals were achieved, but only with a substantial delay. National bank notes were removed from circulation, but not until more than 20 years after the Federal Reserve Act.

The goal of getting a new, elastic currency in place was achieved and more rapidly. Figures 6 and 8 show that after a slow start, most likely due to the difficulties of starting up the new Federal Reserve System and getting the district banks operational, Federal Reserve notes became a large portion of the total currency in the country. The quantity of Federal Reserve notes in circulation amounted to about $3 billion in 1920 (60 percent of currency in circulation). However, both the quantity of Federal Reserve notes in circulation and Federal Reserve notes as a percentage of currency in circulation fell almost continually until hitting their lows of $1.4 billion (33 percent of currency in circulation) in 1930, after which it started to increase once again. This decline in Federal Reserve note circulation was almost matched by an increase in gold certificates, which although not 100 percent backed by gold were backed by a higher percentage of gold than were Federal Reserve notes.[30] This demand for gold certificates may have been motivated by fears that the United States would go off the standard, which it subsequently did in 1933.

I now turn to lessons for governmentally-issued and privately-issued e-moneys that can be learned from the period 1914 to 1934 in the United States.

[30]Gold certificates were first authorized by "An Act to provide Ways and Means for the Support of the Government" passed 3 March 1863. They were to be issued for deposits of gold at the Treasury and "in payment of interest on the public debt." The total amount issued "shall not at any time exceed twenty per centum beyond the amount of coin and bullion in the treasury. . . ." (Sec. 5)

Figure 8: Federal Reserve notes as a percentage of total currency, 1914 - 1936

Should the central bank issue e-money?

It was necessary for the Federal Reserve banks to issue notes, so that the Federal Reserve System could fulfill the central bank function of acting as a lender of last resort, which required the ability to issue a widely accepted medium of exchange. Since most countries today have a central bank with the ability to issue paper currency, this is not a reason for a central bank to issue e-money.

One argument for the central bank to issue its own e-money could be that the central bank would save on the costs of providing coins and currency. However, this is not a strong argument in favor of a governmentally-issued e-money. Given the recent innovations in providing coins and currency, the cost savings do not appear to be large.

Another argument is that issuing e-money would increase the central bank's seigniorage because it would increase the demand for central bank currency, which is the chief source of central bank seigniorage. However, that might not be the case. It possible that central bank e-money would only substitute for the central bank's paper currency. To evaluate this argument requires research on what the demands for the two types of central bank currency would be and what the seigniorage revenue is that could be obtained from each.

The strongest argument for a central bank to issue e-money is that it would be a way for the central bank to continue to have a significant source of seigniorage revenue if its seigniorage revenue were being threatened by a reduced public demand for central bank currency. One possible threat could be privately-issued e-moneys. If privately-issued e-moneys were to substitute for cental bank currency, it would reduce the central bank's seigniorage revenue. Of course, there could be other threats as well. The importance of a central bank having a stable source of a significant amount of seigniorage is that it gives

the central bank operational independence to conduct monetary policy as it sees fit. A reduction of central bank seigniorage is a concern because seigniorage "support[s central bank] operational independence to conduct monetary policy by providing an independent revenue stream outside of the government's budget process" (Fung, Molico, and Stuber, 2014, 11).

If privately-issued e-moneys are already in existence, can the government get its e-money into circulation?

The answer to this question based on the 1914 to 1934 experience in the United States is definitely, Yes. As discussed above, the Federal Reserve banks got Federal Reserve notes into circulation even though national bank notes continued to circulate and only limited actions were taken to get national bank notes out of circulation.

The Federal Reserve Act did this in several ways: (i) It provided Federal Reserve notes with federal government insurance. Federal Reserve notes were obligations of the U.S. government. (ii) It made Federal Reserve notes acceptable as reserves for banks. Banks could deposit Federal Reserve notes with district banks, and these deposits counted as part of the reserves that banks had to hold against their demand deposits. (iii) Federal Reserve notes were receivable for "taxes, customs, and other public dues." (Sec. 16) (iv) The fact that the U.S. was on the gold standard and Federal Reserve notes had to be 40 percent backed by gold meant there was a limit to how many notes could be issued.

For the most part these same methods are available to a central bank today. (i) Because all central bank currencies today are fiat, safety, in the sense of redeemability, is not an issue. (ii) Even though most countries do not impose reserve requirements, most banks choose to hold reserves at the central bank for clearing reasons. A central bank could accept its e-money for bank reserves. (iii) A central bank's e-money could be made legal tender by the government. (iv) Modern monetary theory argues that the supply of a fiat money has to be limited if the fiat money is to be valued. The central banks in most developed countries have at least the implicit commitment to do this as evidenced by the concerns to keep inflation within some low target range. Thus, unless the issuance of e-money by the central bank puts this commitment in doubt, there should not be a problem getting central bank e-money into circulation.

If the central bank should issue e-money, what form should that e-money take?

The answer depends on two considerations: (1) the reason for the central bank to issue e-money and (2) the media of exchange already in existence. Federal Reserve notes were issued because the central bank needed to be able to issue currency in order to act as a lender of last resort. Privately-issued media of exchange, national bank notes, were already in existence, and the public was accustomed to using a paper currency. Hence, it was logical that Federal Reserve notes would also be in the form of a bank note. In fact, in terms of size and color, the design of the Federal Reserve note was quite similar to that of the national bank note.

Today, if the rationale for the central bank issuing e-money is to regain seigniorage revenue being lost because privately-issued e-moneys are replacing central bank currency, then the central bank will have to provide an e-money that is superior to the privately-issued ones, at least across some dimensions. For example, in Weber (2015), I argued that it is likely that

privately-issued e-moneys will not trade at par in all transactions between members of the non-issuer public, or in transactions between the holders of an e-money and the issuer. The reason is that e-moneys could contain a large amount of information about the holder and the issuer, which would provide issuers with strong incentives to engage in various forms of discriminatory or non-linear pricing. A central bank-issued e-money might capture market share by committing not to engage in such practices. In fact, I think it extremely unlikely that a central bank would be permitted to engage in discriminatory or non-linear pricing. Other ways in which a central bank could design an e-money that would be widely adopted by the non-bank public is a great question for future research.

Can privately-issued and central-issued e-moneys coexist, or if the central bank issues e-money will it become the sole issuer?

Introducing a central bank-issued e-money will not necessarily drive out any privately-issued e-moneys that are already in existence. National bank notes did not go out of circulation until more than 20 years after the Federal Reserve Act, and it is likely that they would have continued to circulate if their continued circulation had not been made legally impossible. It seems that the non-bank public will continue to use an old, existing medium of exchange after a new one is introduced, especially if the new one does not offer many advantages over the old one. Federal Reserve notes did not offer much in terms of advantages over national bank notes. They suffered from the same denomination restrictions and had the same federal insurance as did national bank notes. The fact that Federal Reserve notes could be redeemed for lawful money at any of the 12 district banks whereas national bank notes could be redeemed for lawful money only at the issuing bank was probably more of an advantage to banks rather than the non-bank public. Further, it is possible that central bank-issued e-money and privately-issued e-moneys will coexist as a uniform currency if the necessary mechanisms are put in place. In the case of Federal Reserve notes and national bank notes, this was done primarily by requiring that Federal Reserve banks accept national bank notes as reserves against national bank deposits. However, if uniformity is desired, there will have to be mechanisms put in place to achieve it because as argued above, there will be strong incentives for private issuers to engage in non-linear pricing.

I think it is unlikely that if a central bank were to issue e-money it would drive out any privately-issued e-moneys in existence. The government might be able to give the central bank's e-money some advantages over privately-issued ones, such as making the central bank's e-money legal tender. However, private issuers of e-money will have the advantage of being able to engage in discriminatory or non-linear pricing, which will work toward keeping it in circulation.

Should the government be the monopoly issuer?

The reason for eliminating national bank notes was that they interfered with the ability of the Federal Reserve to limit the supply of reserves available to the banking sector. National banks could create notes in exchange for loans or other forms of credit. Federal Reserve banks were required to accept these notes as deposits, and no other bank's reserves at a Federal Reserve Bank were debited when a bank deposited the notes of another national bank. Thus, national banks indirectly had the ability to create reserves for the banking system, reserves that could be used to support the creation of demand deposits.

This need not be the case for privately-issued e-money. Presumably a central bank would not accept privately-issued e-money as a deposit from a financial institution unless the issuer of that e-money had an account with the central bank. In that case, the account of the financial institution depositing the privately-issued e-money would be credited and the deposit of the issuer would be debited. The result: no net creation of reserves. Thus, the potential loss of the ability to control reserves is not an argument for the government to be the monopoly issuer of e-money.

However, there is one strong argument for the government being the monopoly issuer of e-money. If it were the case that privately-issued e-moneys were driving central bank currency out of circulation and threatening the central bank's seigniorage revenue, then this would be a strong argument for prohibiting them, since central bank independence is extremely important.

There is one more takeaway from the way in which Federal Reserve notes were introduced. That takeaway is to have a backup plan. The Federal Reserve Act provided that by authorizing Federal Reserve Bank notes in addition to Federal Reserve notes. Except for differences in the name of the issuing bank (see Noll (2011) for a side-by-side picture of a national bank note and a Federal Reserve Bank note that shows this point), Federal Reserve Bank notes and national bank notes were identical. As described above, Federal Reserve Bank notes served as insurance against the possibility of large amounts of national bank notes being withdrawn, which would severely disrupt exchanges.

Appendix: Arguments Against Bond-Secured Bank Notes Being Inherently Inelastic

There are three arguments that can be made that bond-secured bank notes, at least as applied to national bank notes prior to 1910, are not inherently inelastic. The first is that the collateral constraint on note issuance was not binding. As shown in Figure 9, national banks never held more than 75 percent of the total of U.S. government bonds in existence until 1910. Thus, the bond collateral requirement, in and of itself, could not have been the cause of the inelasticity since there were government bonds available for purchase.

The second argument is that there was not necessarily expense and delay in changing the supply of national bank notes. In other words, it was not the case that national bank notes could not be issued "freely and promptly." Holding excess national bank notes in the vault would have been essentially costless to national banks. National banks were taxed on the amount of notes they had *in circulation*, not on the amount of notes they had received from the Comptroller of the Currency. Although not perfectly predictable, the demands for increasing or decreasing the supply of national bank notes were known to be seasonal. Banks could have purchased the necessary bonds well in advance of the times of the year that they would be needed as collateral for note issuance.

Figure 9: National Banks' Holdings of U.S. Government Bonds as a Percentage of Total Bonds Outstanding

The third argument is that there is some empirical evidence that national bank note issuance was not inelastic during some of the "panics and commercial stringencies" that the quote in Section 6 asserts occurred in 1884, 1890, 1893, 1896, and 1907. This evidence is shown in Figure 10. Crises and panics during the national banking period were studied extensively by Sprague (1910). He classifies the 1893 and 1907 episodes as crises. Note issuance during the 1893 crisis does not appear to have been inelastic. National bank note issuance increased by 18 percent between July and October 1893. The same is true of the

crisis of 1907. National bank note issuance increased by 9 percent between August and December 1907. However, in the 1890 episode, which Sprague (1910) classifies as a panic, which is less severe than a crisis, national bank note issuance was essentially flat. And in the 1884 episode, which Sprague (1910) classifies as a financial stringency, which is even less severe than a panic, national bank note issuance actually decreased. Sprague (1910) does not discuss the 1896 episode, but national bank note issuance increased by 5 percent between February and May 1896 and another 5 percent between July and October of that year.

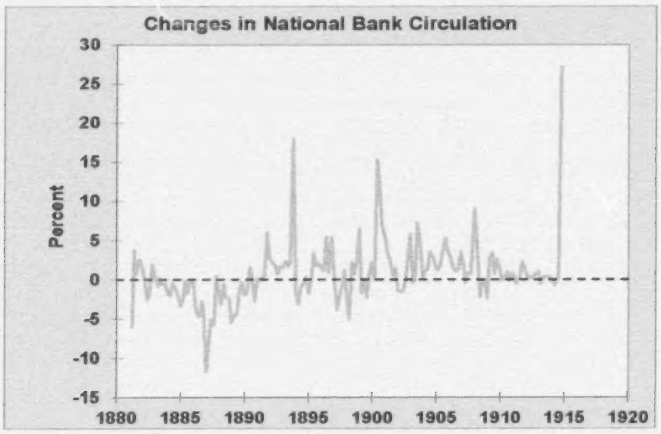

Figure 10: Changes in National Bank Note Circulation at Call Report Dates

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